

Claims 1 through 4, 6 through 8, 10 through 14 and 16 through 18 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. patent 6,486,938 (Morita), as set forth at pages 2-3 of the Office Action. Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Morita in view of U.S. patent 6,251,550 (Ishikawa). Ishikawa has been relied upon for concluding that it would have been obvious to write pattern data in the Morita system in pixel form on a substrate. The rejections are respectfully traversed.

Claims 1 and 11 are independent. Claim 1 is reproduced below.

1. A pattern writing apparatus for writing a pattern by light irradiation on a photosensitive material, comprising:

a spatial light modulator applying a modulated light beam to an irradiation region group arrayed in a lattice arrangement on a photosensitive material;

a main scanning mechanism for scanning said irradiation region group over a photosensitive material in a main scanning direction that is tilted relative to a direction of arrangement of said irradiation region group, so that a plurality of irradiation regions pass over each of writing regions included in a writing region group fixed on said photosensitive material;

a sub-scanning mechanism for intermittently moving said irradiation region group relative to a photosensitive material in a sub-scanning direction orthogonal to said main scanning direction by a distance shorter than a width of said irradiation region group in said sub-scanning direction; and

a controller controlling said spatial light modulator in synchronization with main scanning of said irradiation region group.

Claim 1 requires that a group of irradiation regions are arrayed in a lattice arrangement. Photosensitive material is divided into a plurality of writing regions. The main scanning mechanism, in operation, causes relative movement of the irradiation regions in a main scanning direction with respect to the photosensitive material such that each of the writing regions is

passed over by a plurality of the irradiation regions. Whether or not a particular writing region is irradiated, for each pass of the plurality of irradiation regions, is controlled by the controller.

The main scanning direction is tilted relative to the direction of the lattice arrangement of the irradiation region group. As may be understood from the description of Figs. 5-7 in the disclosure, the lattice arrangement of the irradiation regions 61 is disposed at an angle with the vertical main scanning direction. A main scan is performed on strip of the substrate in the illustrated apparatus of Fig. 2 by moving the substrate in the Y direction with respect to the projection lens. In the main scan, each of the writing regions 620 of the strip will be subject to a plurality of irradiation regions (Figs. 5-7).

Fig. 8 illustrates the strip 71 which has undergone the main scan. Upon completion of irradiation of the strip by the main scanning mechanism, a sub-scanning mechanism causes movement of the substrate in the sub-scanning direction (orthogonal to the main scanning direction) to the position shown for a subsequent main scanning operation on adjacent strip 72. The irradiation region group moves intermittently in the sub-scanning direction by a distance shorter than the width of the irradiation group in the sub-scanning direction. This claimed intermittent movement in the sub-scanning direction provides an overlap in writing regions of the two strips, the overlapping writing regions being subject to irradiation in both main scans. The purpose of this overlap is discussed in the specification with respect to Fig. 9. The tilt of the lattice arrangement with respect to the main scanning direction causes fewer instances of interaction between the irradiation regions and the writing regions in each main scan of the overlap portion of the strip. Performing main scanning operation on the overlapping portion for both strips 71 and 72 provides consistency of exposure with respect to the non-overlapping portions, as shown in Fig. 9.

Independent claim 11 is a method claim, corresponding to claim 1. Claim 11 recites moving the irradiation group relative to the photosensitive material between main scanning operations. Dependent claims 2 through 4, 6 through 10, 12 through 14 and 16 through 20 more detailed requirements of the geometric configurations.

It is submitted that Morita does not disclose or suggest the invention required by claims 1 through 4, 6 through 14, and 16 through 20. Morita et al. corresponds to the document (Japanese Patent Application Laid-open No. 2001-133893) cited in the specification from page 1, line 16 to page 2, line 4.

In Morita, as disclosed in col. 5, lines 18-28, the paper 2 is transported in a sub-scanning direction and the direction perpendicular to the sub-scanning direction is formally called “main scanning direction.” The irradiation points are not moved in the main scanning direction. In the various examples illustrated in Figs. 4-11 of Morita, the individual sources of irradiation may be selected or not for radiation, but these source points of irradiation are not moved in the scanning direction with respect to the photosensitive material. Moreover, as disclosed in Fig. 4 and col. 5, lines 33-48, only two mirror sets out of numerous micromirrors 41 are used for irradiation; one mirror set is the so-called main scanning mirror set in which micromirrors are arranged in the main scanning direction and the other mirror set is the so-called interpolative main scanning mirror set in which micromirrors are arranged in the main scanning direction. The micromirrors other than the main scanning mirror set and the interpolative main scanning mirror set are not used for irradiation.

In Figs. 5 to 8 of Morita, the arrangements of the two mirror sets are modified. However, the concept of aligning the micromirrors in the main scanning direction is not changed as there is no disclosed intention in Morita to arrange micromirrors used for irradiation in a lattice

arrangement as required in claims 1 and 11. Fig. 9 in Morita is directed to extending the two lines of micromirrors to three colors of RGB.

In summary, Morita does not disclose the claimed requirements for “an irradiation region group arrayed in a lattice arrangement” or “a plurality of irradiation regions pass over each of writing regions included in a writing region group” or “intermittently moving said irradiation region group relative to a photosensitive material in a sub-scanning direction orthogonal to said main scanning direction by a distance shorter than a width of said irradiation region group in said sub-scanning direction.” Ishikawa does not overcome these deficiencies in Morita. Ishikawa has been relied upon solely for teaching applying a writing method with a substrate.

In Morita, since a part (i.e., only two lines) of the disclosed micromirrors arrangement are used for irradiation, there is no teaching of an irradiation region group arrayed in a lattice arranged. If anything, Morita teaches away from such a provision. In the claimed invention, the irradiation region group is moved relatively in the main scanning direction and the sub-scanning direction. In Morita, lights from two lines of the main scanning mirror set and the interpolative main scanning mirror set are continuously scanned only in the sub-scanning direction defined in Morita. The sub-scanning direction defined in Morita does not correspond to the sub-scanning direction of the present invention and the points of irradiation of Morita do not move in the main scanning direction defined in Morita, which does not correspond to the main scanning direction of the present invention.

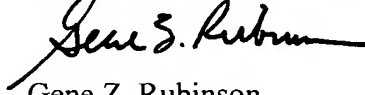
Accordingly, it is submitted that claims 1 through 20 are patentably distinct. Withdrawal of the rejections and allowance of the application are respectfully solicited. To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of

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time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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